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Symptom Management and Supportive Care

Impact of Onset of Psychiatric Disorders and Psychiatric Treatment on Mortality Among Patients with Cancer

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Disclosures of potential conflicts of interest may be found at the end of this article.

Key Words. Psycho-oncology • Cancer • Mortality • Psychiatric diagnosis • Psychotherapy

Abstract

Background. Psychiatric disorders are common in patients with cancer. The impact of both psychiatric disorders and psychiatric treatment on mortality in patients with cancer needs to be established.

Materials and Methods. Nationwide claims data were analyzed. To investigate the association between psychiatric disorders and mortality, 6,292 male and 4,455 female patients with cancer who did not have a record of psychiatric disorders before cancer onset were included. To examine the association between psychiatric treatment and mortality, 1,467 male and 1,364 female patients with cancer were included. Incident psychiatric disorder and receipt of psychiatric treatment within 30 days from the onset of a psychiatric disorder were the main independent variables. Dependent variables were all-cause and cancer-related mortality. Cox proportional hazards regression with time-dependent covariates was used.

Results. The onset of psychiatric disorders was associated with a significantly increased risk of mortality in both male (all-cause hazard ratio [HR]: 1.55; cancer-related HR: 1.47) and female patients with cancer (all-cause HR: 1.50; cancer-related HR: 1.44) compared with patients with cancer without psychiatric disorders. Both male and female patients who received psychiatric treatment within 30 days of diagnosis of a psychiatric disorder had a lower risk of cancer-related mortality (males, HR: 0.73; females, HR: 0.71) compared with patients with cancer with psychiatric disorders who did not receive psychiatric treatment.

Conclusion. Patients with cancer with newly diagnosed psychiatric disorders had a higher mortality rate. Among these, those who received psychiatric treatment showed lower rates of mortality. Thus, early detection and early treatment of psychiatric disorders in patients with cancer is needed.

The Oncologist 2020;25:e733–e742

Implications for Practice: The current study supplements the body of evidence supporting the association of psychiatric disorders onset and treatment with cancer outcomes. Patients with cancer showed an increased risk of both all-cause and cancer-related mortality upon psychiatric disorder onset. Among patients with newly diagnosed psychiatric disorders, those who received psychiatric treatment showed lower cancer-related mortality. Thus, raising awareness of both the risk of psychiatric disorders and the positive effects of psychiatric treatment on cancer outcomes is necessary among patients with cancer, caregivers, and oncologists. Furthermore, it is necessary to adopt a multidisciplinary approach, encouraging patients with cancer to undergo a neuropsychological assessment of their mental health status and receive appropriate and timely psychological interventions.

Introduction

Cancer is a major issue for health authorities worldwide. Globally, it is estimated that in 2018, 18 million people were newly diagnosed with cancer, and 9.6 million died of it [1]. In South Korea, cancer is a major health problem, as it has remained the leading cause of death for several decades. However, modern medical advances have increased the 5-year survival rate

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for patients with cancer from 41.2% between 1993 and 1995 to 70.7% between 2011 and 2015 [2].

As cancer survival rates increase, the mental health of patients with cancer is increasingly prominent. A cancer diagnosis is life-threatening and can have major psychological effects. Patients' awareness of their cancer diagnosis could lead to psychological stress [3, 4]. Additionally, fear of death, grief about losses, and worries about friends and family could also contribute to psychological distress [5, 6]. Furthermore, radiotherapeutic or chemotherapeutic interventions can also affect patients' mental status. Such psychological distress could increase their vulnerability to mental health problems, which may affect their health behavior patterns and become diagnosable psychiatric disorders [7, 8]. Thus, treating mental health is an important clinical oncology issue [9].

Patients with cancer have higher rates of psychiatric disorders than the general population [10, 11], including major depression, anxiety, adjustment disorders, delirium, and substance dependence disorders [9, 12]. Approximately 30%–50% of patients with cancer suffer from psychiatric disorders [13]. Particularly, depression is two to four times more common in patients with cancer than in the general population [14, 15].

In patients with cancer, psychiatric distress needs to be treated promptly, as delayed diagnosis or treatment may incur side effects, which could affect their health outcomes [16]. Untreated psychological distress is associated with desire for death [17], disability [18], reduced quality of life [19], aggravated pain [20], diminished ability to plan end of life [21], and caregivers' diminished psychosocial functioning [22] as well as prolonged hospitalization [19] and reduced cancer treatment adherence [17]. Considering that psychiatric disorders among patients with cancer may be treatable [23], timely and appropriate approaches for diagnosis and treatment are needed to avoid negative consequences.

Despite numerous studies in recent decades focusing on depression and anxiety disorders in patients with cancer, few have examined the whole spectrum of psychiatric disorders or the effects of psychiatric treatment on clinical outcomes. Considering the important impact of psychiatric disorders on clinical outcomes, a study assessing psychiatric disorders from a broader perspective in relation to cancer mortality is warranted.

Thus, this study aimed to investigate the association between psychiatric disorder onset and mortality among patients with cancer. Moreover, we further investigated the association between psychiatric treatment and mortality among patients with cancer with psychiatric disorders.

Materials and Methods

Data and Study Population

This study used National Health Insurance claims data from 2002 to 2013. This data set included records from 1,025,340 individuals, representing approximately 2.2% of the Korean population [24]. Patients' claims data are recorded in four categories: insurance eligibility, medical institutions' data, health examination data, and medical treatments (i.e., diagnosis code, medication, and treatment) [24].

Patients with gastric (C16), colorectal (C18–C19), lung (C34), and breast cancer (C50, only female)—the most frequent cancers in South Korea—were identified using International Classification of Disease 10th revision (ICD-10) codes. Next, those who met the criteria for cancer, meaning that they visited a medical institution under an ICD-10 C code at least three times within a year and/or were hospitalized in a medical institution under a C code, were selected [25]. We excluded patients whose year of cancer diagnosis was 2002 (for wash-out) or 2013 (to allow at least 1-year follow-up). We also excluded 2,245 men and 4,679 women who had an ICD F code (F00–F99), which indicates psychiatric disorder, prior to cancer onset, as we aimed to identify patients with new-onset psychiatric disorders after cancer diagnosis. After excluding patients aged under 20 and those insured by medical aid, the sample comprised 6,292 men and 4,455 women. To investigate the association between psychiatric treatment and mortality, 1,515 men and 1,389 women diagnosed with psychiatric disorders after cancer onset were included. Among these, those who died within 30 days of diagnosis of psychiatric disorder were excluded from follow-up of psychiatric treatment. Thus, the final sample was 1,467 men and 1,364 women (supplemental online Fig. 1). This study was approved by the Institutional Review Board of Yonsei University Health System (Y-2018-0065).

Variables

The dependent variables were all-cause and cancer-related mortality. Patients with death codes C16, C18–C20, C34, and C50 (for women) were considered to have died of cancer.

One of the main variables was postcancer psychiatric disorder onset. New-onset psychiatric disorder was defined as a psychiatric disorder diagnosis in a patient who had no record of psychiatric disorder (ICD-10 F codes) before cancer onset. For analysis, F codes were reclassified into six groups based on frequencies of psychiatric disorders among patients with cancer [26]: (a) organic (including symptomatic) mental disorders (F00–F09); (b) mood disorders (F30–F39); (c) anxiety disorders (F40–F42); (d) neurotic, stress-related, and somatoform disorders (F43–F45, F48, F50); (e) sleep disorders (F51, G47); and (f) other.

To investigate the effect of psychiatric treatment, patients with cancer who underwent psychotherapy or were prescribed psychiatric medication after psychiatric disorder onset were considered to have received psychiatric treatment; the time limit for receiving such psychiatric treatment was set as 30 days from psychiatric disorder diagnosis. If patients did not undergo psychotherapy or were not prescribed psychiatric medication within that time span, they were considered to have not received psychiatric treatment. The type of psychotherapy and medications were identified from treatment codes and generic codes (supplemental online Tables 1, 2).

To analyze the association between psychiatric diagnosis and mortality among patients with cancer, their age,

Table 1. Hazard ratios for all-cause and cancer-related mortality with newly diagnosed psychiatric disorder after cancer onset

	Total			All-cause mortality					Cancer-related mortality				
Variables	***n***	**(%)**	**Person-years**	**Death rate, per 1,000 person-years**	***n***	**(%)**	**HR (95% CI)[a]**	***p* value**	**Death rate, per 1,000 person-years**	***n***	**(%)**	**HR (95% CI)[a]**	***p* value**
Male													
Psychiatric disorder after cancer onset													
Onset	1,515	(24)	7,944	74.0	588	(39)	1.55 (1.41–1.71)	<.0001	56.3	447	(30)	1.47 (1.32–1.63)	<.0001
Nononset	4,777	(76)	15,326	156.1	2,393	(50)	1 (Reference)		133.6	2,048	(43)	1 (Reference)	
Type of psychiatric disorder													
Organic, including symptomatic, mental disorders	130	(2)	630	85.7	54	(42)	2.01 (1.53–2.65)	<.0001	55.5	35	(27)	1.65 (1.17–2.31)	.0039
Mood disorders	223	(4)	1,254	63.8	80	(36)	1.64 (1.31–2.06)	<.0001	45.4	57	(26)	1.48 (1.14–1.94)	.0039
Anxiety disorders	288	(5)	1,647	60.1	99	(34)	1.38 (1.12–1.69)	.0023	47.4	78	(27)	1.40 (1.11–1.76)	.0040
Neurotic, stress-related, and somatoform disorders	313	(5)	1,825	58.1	106	(34)	1.37 (1.12–1.67)	.0021	42.2	77	(25)	1.26 (1.00–1.59)	.0522
Sleep disorders	468	(7)	2,141	97.6	209	(45)	1.53 (1.32–1.77)	<.0001	81.7	175	(37)	1.54 (1.31–1.80)	<.0001
Others	93	(2)	447	89.6	40	(43)	2.21 (1.61–3.02)	<.0001	56.0	25	(27)	1.69 (1.13–2.51)	.0102
None	4,777	(76)	15,326	156.1	2,393	(50)	1 (Reference)		133.6	2,048	(43)	1 (Reference)	
Male total	6,292	(100)	23,270	128.1	2,981	(47)			107.2	2,495	(40)		
Female													
Psychiatric disorder after cancer onset													
Onset	1,389	(31)	8,112	39.2	318	(23)	1.50 (1.31–1.72)	<.0001	29.5	239	(17)	1.44 (1.23–1.67)	<.0001
Nononset	3,066	(69)	12,265	86.1	1,056	(34)	1 (Reference)		73.1	897	(29)	1 (Reference)	
Type of psychiatric disorder													
Organic, including symptomatic, mental disorders	91	(2)	421	92.6	39	(43)	3.57 (2.57–4.96)	<.0001	64.1	27	(30)	3.04 (2.07–4.46)	<.0001
Mood disorders	263	(6)	1,513	41.0	62	(24)	1.41 (1.08–1.84)	.0109	34.4	52	(20)	1.42 (1.07–1.88)	.0042
Anxiety disorders	357	(8)	2,249	23.1	52	(15)	1.08 (0.82–1.44)	.5798	14.7	33	(9)	0.89 (0.64–1.24)	.4224

(continued)

Table 1. (continued)

Variables	Total			All-cause mortality				Cancer-related mortality			
	n	(%)	Person-years	Death rate, per 1,000 person-years	*n*	(%)	HR (95% CI)[a]	*p* value	Death rate, per 1,000 person-years	*n*	(%)	HR (95% CI)[a]	*p* value
Neurotic, stress-related, and somatoform disorders	248	(6)	1,640	26.2	43	(17)	1.20 (0.88–1.64)	.2560	20.7	34	(14)	1.23 (0.87–1.73)	.1790
Sleep disorders	369	(8)	1,974	50.7	100	(27)	1.68 (1.36–2.07)	<.0001	38.0	75	(20)	1.69 (1.35–2.11)	.0005
Others	61	(1)	315	70.0	22	(36)	1.60 (1.03–2.46)	.0353	57.2	18	(30)	1.68 (1.05–2.68)	.0315
None	3,066	(69)	12,265	86.1	1,056	(34)	1 (Reference)		73.1	897	(29)	1 (Reference)	
Female total	4,455	(100)	20,377	67.4	1,374	(31)			55.8	1,136	(26)		

[a]Adjusted for age group, income, insurance status, existence of disability, residential area, cancer site, Charlson comorbidity index, cancer treatment method, cancer diagnosed medical institution, existence of neuropsychiatry department, location of hospital, and cancer onset year.
Abbreviations: CI, confidence interval; HR, hazard ratio.

income, insurance status, disability status, residential area, cancer site, Charlson comorbidity index, cancer treatment method, type, location, existence of a neuropsychiatry department in the diagnosing medical institution, and year of cancer onset were controlled for. Additionally, to analyze the association between psychiatric treatment and mortality, the type of psychiatric disorder and time to onset of psychiatric disorder (time period between cancer onset and psychiatric disorder onset) were controlled for (supplemental online Table 3).

Statistical Analysis

Chi-squared tests were conducted to examine the distribution of general characteristics in the sample by calculating frequencies and percentages. Survival analyses were used for the main models. When analyzing cancer-related mortality, all-cause mortality was considered a competing risk. First, a Cox proportional hazards model with time-dependent covariates was conducted to examine the association between psychiatric disorder onset and all-cause/cancer-related mortality among patients with cancer. Then, a Cox proportional hazards model was used to analyze the association between psychiatric treatment and all-cause/cancer-related mortality among patients with cancer with newly diagnosed psychiatric disorders.

Moreover, we conducted a sensitivity analysis by excluding patients newly diagnosed with organic (including symptomatic) mental disorders in order to examine whether the relationship between new-onset psychiatric disorders and cancer-related mortality would still hold. Treatment for psychiatric disorder was limited to within 30 days from the date of psychiatric disorder diagnosis, and patients who died within 30 days after psychiatric diagnosis were excluded from the landmark analysis. Sensitivity analyses were conducted by limiting treatment time to 3, 6, and 12 months from psychiatric diagnosis date. All statistical analyses were conducted separately by gender and using SAS software (version 9.4; SAS, Cary, NC).

Results

Table 1 shows the distribution of general characteristics in the study population. Of 6,292 male and 4,455 female patients with cancer, 1,515 males and 1,389 females experienced new-onset psychiatric disorders. In men, 588 patients who developed new-onset psychiatric disorders died (all-cause death rate: 74.0 per 1,000 person-years), with 447 dying of cancer (cancer death rate: 56.3 per 1,000 person-years). In women, 318 patients who developed new-onset psychiatric disorders died (all-cause death rate: 39.2% per 1,000 person-years), with 239 dying of cancer (cancer death rate, 29.5% per 1,000 person-years; Table 1).

Regarding the type of psychiatric disorder, sleep disorder was the most frequent psychiatric diagnosis among both male (*n* = 468, 7.4%) and female patients (*n* = 369, 8.3%). The second most frequent psychiatric diagnosis was neurotic, stress-related, and somatoform disorders among male patients (*n* = 313, 5.0%), and anxiety disorders among female patients (*n* = 357, 8.0%). The third most frequent psychiatric diagnosis was anxiety disorders among male patients

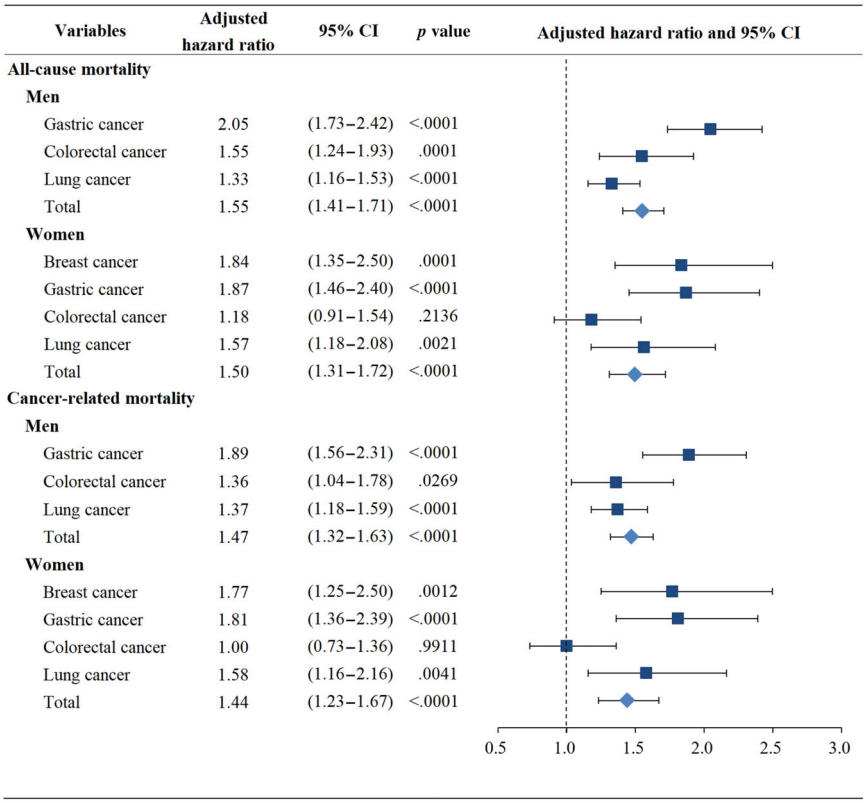

Figure 1. Hazard ratios for mortality associated with newly diagnosed psychiatric disorder by cancer site.
Abbreviation: CI, confidence interval.

(*n* = 288, 4.6%), and mood disorders among female patients (*n* = 263, 5.9%). The average time from cancer diagnosis to onset of psychiatric disorders was 877.7 days in men and 837.4 days in women (supplemental online Table 5).

Table 1 also shows the results of the Cox proportional hazards model with time-dependent covariates for the association between psychiatric disorder onset and mortality. Psychiatric disorder onset was associated with a significantly increased risk of death in both men (all-cause mortality hazard ratio [HR]: 1.55, $p < .0001$; cancer-related mortality HR: 1.47, $p < .0001$) and women (all-cause mortality HR: 1.50, $p < .0001$; cancer-related mortality HR: 1.44, $p < .0001$) compared with patients with cancer without psychiatric disorders. This association was still observed after excluding patients with organic (including symptomatic) mental disorders in both men (all-cause mortality HR: 1.51, $p < .0001$; cancer-related mortality HR: 1.43, $p < .0001$) and women (all-cause mortality HR: 1.49, $p < .0001$; cancer-related mortality HR: 1.42, $p < .0001$; supplemental online Table 8).

Regarding the type of psychiatric disorder, the onset of organic (including symptomatic) mental disorders was associated with the highest risk of death in both men (all-cause mortality HR: 2.01, 95% confidence interval [CI]: 1.53–2.65; cancer-related mortality HR: 1.65, 95% CI: 1.17–2.31) and women (all-cause mortality HR: 3.57, 95% CI: 2.57–4.96; cancer-related mortality HR: 3.04, 95% CI: 2.07–4.46). In men, the onset of mood disorders was associated with the second highest risk of all-cause mortality (HR: 1.64, 95% CI: 1.31–2.06) and third highest risk of cancer-related mortality (HR: 1.48, 95% CI: 1.14–1.94). Onset of sleep disorders was associated with the third highest risk of all-cause mortality (HR: 1.53, 95% CI: 1.32–1.77) and second highest risk of cancer-related mortality (HR: 1.54, 95% CI: 1.31–1.80). In women, onset of sleep disorders was associated with the second highest risk of all-cause mortality (HR: 1.68, 95% CI: 1.36–2.07) and cancer-related mortality (HR: 1.69, 95% CI: 1.35–2.11).

When stratifying by cancer site, the highest risk of mortality for patients with cancer with new-onset psychiatric disorders was observed for those with gastric cancer among both men (all-cause mortality HR: 2.05, $p < .0001$; cancer-related mortality HR: 1.89, $p < .0001$) and women (all-cause mortality HR: 1.87, $p < .0001$; cancer-related mortality HR: 1.81, $p < .0001$). In women, patients with breast cancer showed the second highest mortality upon psychiatric disorder onset (all-cause mortality HR: 1.84, $p = .0001$; cancer-related mortality HR: 1.77, $p = .0012$; Fig. 1).

Table 2 shows the association between receiving psychiatric treatment within 30 days of psychiatric diagnosis and mortality. A total of 1,467 men were diagnosed with new-onset psychiatric disorders. Of these, 1,097 received psychiatric treatment; among them, 397 patients died (all-cause mortality), with 292 dying of cancer. Compared with those who did not receive treatment for new-onset psychiatric disorders, those who received treatment showed lower HR (0.81, $p = .0376$). Regarding the type of psychiatric treatment, only pharmacotherapy showed a statistically significant association with mortality (all-cause HR: 0.79, $p = .0277$; cancer-related mortality HR: 0.71, $p = .0039$).

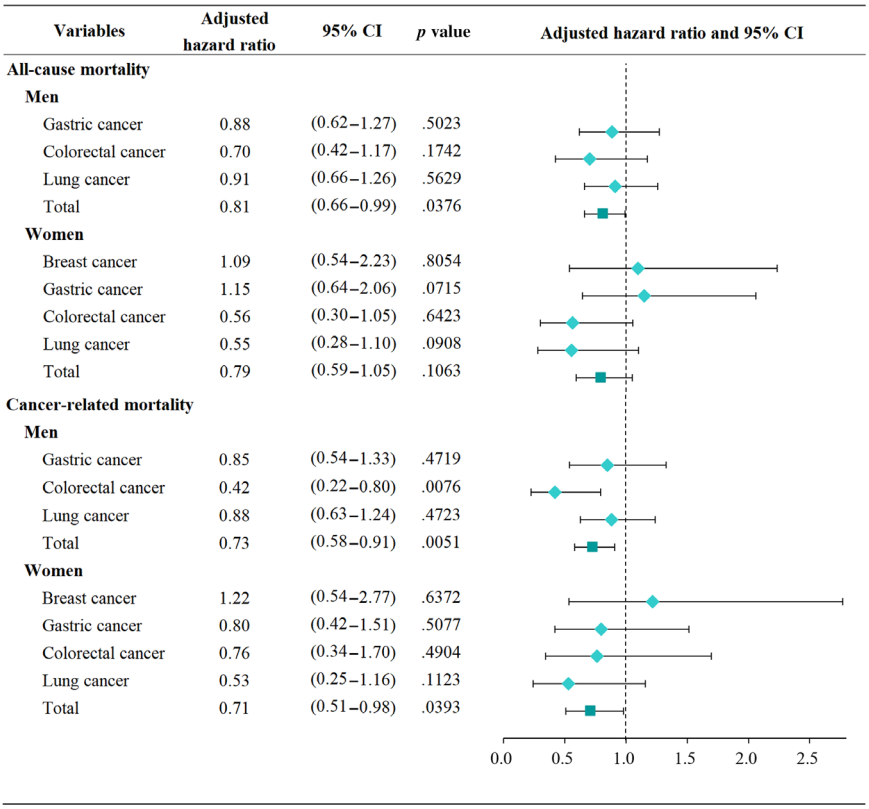

Figure 2. Hazard ratios for mortality associated with receiving psychiatric treatment within 30 days from the diagnosis of psychiatric disorder among patients with cancer with newly diagnosed psychiatric disorder by cancer site.
Abbreviation: CI, confidence interval.

In women, 1,364 patients were diagnosed with psychiatric disorders after cancer onset (Table 2). Of these, 1,052 patients received psychiatric treatment; among them, 216 died (all-cause mortality), with 155 dying of cancer. Compared with those who did not receive treatment for new-onset psychiatric disorders, those who received psychiatric treatment showed lower HR for cancer-related mortality (0.71, p = .0393).

When stratifying by cancer sites, only men with colorectal cancer showed lower rates of cancer-related mortality (HR: 0.42, 95% CI: 0.22–0.80) compared with patients with colorectal cancer who did not receive psychiatric treatment (Fig. 2). Figure 3 shows the results of the sensitivity analysis. When the time between psychiatric disorder onset and receipt of psychiatric treatment increased, the mortality risk also increased, although this association was not statistically significant.

Discussion

The results of the present study showed that both male and female patients with cancer with new-onset psychiatric disorders had a higher risk of mortality compared with patients with cancer without psychiatric disorders. Regarding the cancer site, both men and women with gastric cancer, and women with breast cancer, with new-onset psychiatric disorders showed the highest mortality rates. Organic (including symptomatic) mental disorders, mood disorders, and sleep disorders were associated with a higher risk of mortality in both genders compared with those without new-onset psychiatric disorders.

Prior studies have shown that depression, schizophrenia, substance-abuse disorders, and other psychotic disorders increase the mortality rate of patients with cancer [27–30]. Furthermore, poor quality of cancer treatment could help explain their findings [31–35]. For example, delirium produces symptoms of attention deficit and loss of awareness, which affects communication with family members and impedes participation in treatment-related decisions, symptom assessment, and counseling; together, these factors in turn may aggravate the burden of symptom distress [36, 37]. Moreover, patients with psychiatric disorders tend to lack social support [38, 39]. Previous studies have demonstrated that patients with low quality or degree of social support and supportive relationships have lower survival rates [38, 39]. Thus, the combination of these factors may adversely affect cancer treatment and render patients more vulnerable to negative cancer outcomes.

According to our results stratified by cancer site, both men and women with gastric cancer and women with breast cancer diagnosed with new-onset psychiatric disorders showed the highest mortality rate compared with patients with cancer without psychiatric disorders. Usually, because of the comorbid dumping syndrome (in the case of gastrectomy) or gastrointestinal reflux, gastric cancer adversely affects eating behavior as well as emotional and physical functioning [40]. On the other hand, breast cancer produces serious mental health problems among women, who may experience sexual dysfunction,

Table 2. Hazard ratios for all-cause and cancer-related mortality with receiving psychiatric treatment within 30 days of the diagnosis of psychiatric disorder among the patients with newly diagnosed psychiatric disorder after cancer onset

	Total			All-cause mortality				Cancer-related mortality				
Variables	*n*	(%)	Person-years	Death rate, per 1,000 person-years	*n*	(%)	HR (95% CI)[a]	*p* value	Death rate, per 1,000 person-years	*n*	(%)	HR (95% CI)[a]	*p* value
Male													
Receipt of psychiatric disorder treatment													
Yes	1,097	(75)	3,446	115.2	397	(36)	0.81 (0.66–0.99)	.0376	84.7	292	(27)	0.73 (0.58–0.91)	.0051
No	370	(25)	853	179.4	153	(41)	1 (Reference)		143.1	122	(33)	1 (Reference)	
Type of psychiatric disorder treatment													
Both psychotherapy and pharmacotherapy	85	(6)	294	126.0	37	(44)	0.85 (0.58–1.24)	.4018	85.1	25	(29)	0.73 (0.46–1.15)	.1776
Psychotherapy only	137	(9)	443	103.8	46	(34)	0.91 (0.64–1.29)	.5896	74.5	33	(24)	0.88 (0.58–1.34)	.5570
Pharmacotherapy only	875	(60)	2,709	115.9	314	(36)	0.79 (0.64–0.98)	.0277	86.4	234	(27)	0.71 (0.56–0.90)	.0039
None	370	(25)	853	179.4	153	(41)	1 (Reference)		143.1	122	(33)	1 (Reference)	
Male total	1,467	(100)	4,299	128.0	550	(38)			96.3	414	(28)		
Female													
Receipt of psychiatric disorder treatment													
Yes	1,052	(77)	941	54.2	216	(21)	0.79 (0.59–1.05)	.1063	38.9	155	(15)	0.71 (0.51–0.98)	.0393
No	312	(23)	3,983	92.5	87	(28)	1 (Reference)		75.5	71	(23)	1 (Reference)	
Type of psychiatric disorder treatment													
Both psychotherapy and pharmacotherapy	72	(5)	244	69.6	17	(24)	0.67 (0.38–1.17)	.1566	36.8	9	(13)	0.39 (0.19–0.82)	.0131
Psychotherapy only	166	(12)	715	46.2	33	(20)	0.67 (0.43–1.07)	.0947	35.0	25	(15)	0.56 (0.33–0.96)	.0355
Pharmacotherapy only	814	(60)	3,024	54.9	166	(20)	0.83 (0.61–1.12)	.2297	40.0	121	(15)	0.79 (0.56–1.12)	.1815
None	312	(23)	941	92.5	87	(28)	1 (Reference)		75.5	71	(23)	1 (Reference)	
Female total	1,364	(100)	4,924	61.5	303	(22)			45.9	226	(17)		

[a]Adjusted for age group, income, insurance status, existence of disability, residential area, cancer site, type of psychiatric disorder, Charlson comorbidity index, cancer treatment method, cancer diagnosed medical institution, existence of a neuropsychiatry department, location of hospital, time to onset of psychiatric disorder, and cancer onset year.
Abbreviations: CI, confidence interval; HR, hazard ratio.

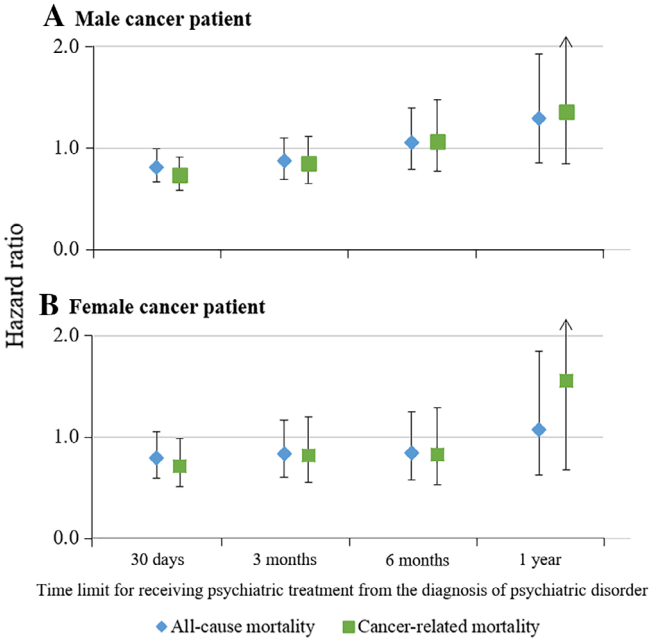

Figure 3. Hazard ratios for mortality with psychiatric treatment receipt by time limit for receiving psychiatric treatment from the diagnosis of psychiatric disorder.

concerns about infertility, menopausal syndrome, and emotional distress, including anxiety and depression, due to the negative effects of mastectomy on their body image [41–43]. Furthermore, Watson et al. [30] found that patients with breast cancer who reported feelings of hopelessness or helplessness were more likely to die compared with those who did not experience such negative emotions.

In the current study, patients with cancer with newly diagnosed psychiatric disorders after cancer diagnosis showed lower rates of mortality when they received psychiatric treatment. Both men and women who received psychiatric treatment within 30 days of psychiatric diagnosis showed lower cancer-related mortality compared with those with psychiatric disorders who did not receive treatment. Previous studies on this association have yielded conflicting results, with some indicating that psychotherapy was not associated with cancer outcomes, contrary to the present results [44–47]. Nevertheless, in one study, although group therapy had no association with survival, it improved quality of life [46]. Numerous other studies showed positive associations between psychiatric treatment and cancer outcomes. For instance, it has been suggested that pharmacotherapy can potentially reverse the severity of cognitive symptoms in depressed patients with cancer [48]. A recent study of patients with cancer found that depressive symptoms were associated with longer duration of hospitalization, but only in patients not taking antidepressant medication [49]. Therefore, antidepressants could alleviate negative outcomes of patients with cancer with depression. Furthermore, some antidepressants, for example, mirtazapine, may also alleviate some chemotherapy-related symptoms, such as nausea or cachexia-anorexia [50].

In South Korea, stereotypes and prejudice may lead to insufficient awareness of the mental health needs of patients with cancer. Consequently, the optimal intervention timing may be overlooked [26]. Moreover, patients with cancer are vulnerable to impaired mental health, and delay or absence of treatment for psychiatric disorders may worsen their impact on cancer outcomes. Studies on early psycho-oncologic interventions, such as education about coping skills, demonstrated effective ways to control psychological distress, including depression and anxiety [51, 52]; hence, early identification and treatment of psychological disorders is crucial.

The present results have several implications. First, awareness about the risk of psychiatric disorders should be promoted among patients with cancer, their caregivers, and oncologists. Because some psychiatric disorders, including depression and anxiety, could be regarded as natural consequences of cancer treatment, or may even be difficult to distinguish from chemotherapy side effects, many patients, caregivers, and oncologists tend to neglect these symptoms and leave them untreated [53]. Thus, education about psychiatric symptoms and disorders needs to be provided at the cancer diagnosis stage or during treatment. Second, it is necessary to promote psychiatric consultation. Even if patients desire psychological support [54], it may be difficult to recognize their psychological symptoms, and only a small proportion of patients with cancer who experience psychological distress receive psychiatric interventions [55]. Therefore, physicians should be aware of the types of patients who may be vulnerable to psychological distress and refer them for neuropsychiatric assessment/intervention in a timely manner. This requires a multidisciplinary approach; by connecting the oncology and neuropsychiatry departments and encouraging patients to undergo consultations, the mental health status of patients with cancer could be screened, and appropriate interventions could be offered. Third, considering that the average time from cancer diagnosis to onset of psychiatric disorders was 2–3 years, it is important to pay attention to patients with cancer who are in the survivorship period.

Limitations

The results of this study should be interpreted with caution because of several limitations. First, the limitations of administrative data due to potential inaccuracies have been previously discussed. For instance, ICD-10 codes in cohort data may not always represent patients' real disease status because their primary purpose is to facilitate patients' health insurance claims [24]. However, a previous study demonstrated a 70% correspondence between claims codes and medical record codes [56].

Second, because our study used administrative data, potential confounders that could affect mortality, such as health-related behaviors (e.g., smoking, drinking, and physical activity) and presence of caregivers, could not be controlled for, as this information was not available.

Third, the exact stage of cancer could not be analyzed because the data set did not contain this information. Thus, it could be that patients with new-onset psychiatric disorders were more ill and therefore had higher mortality. Similarly, patients with more advanced illness may have been less likely to receive psychiatric treatment and therefore also had increased mortality. However, to compensate for this limitation, cancer treatment methods (operation only, chemotherapy or

radiotherapy before or after operation, and chemotherapy or radiotherapy only) were considered to approximately gauge cancer severity. However, this system may be imprecise because some chemotherapy drugs were not covered by the National Health Insurance during the study period.

Fourth, psychiatric disorder severity could not be included in this model because disorders were identified and classified using ICD-10 codes. Furthermore, owing to the characteristics of the claim data, only patients who visited medical institutions with psychiatric symptoms and were diagnosed using a fixed set of psychiatric disorder classification codes were considered. Therefore, patients who exhibited psychiatric distress but did not visit medical institutions were not included. Thus, some study participants' mental health status may have been misrepresented.

Fifth, psychotherapy was also identified and classified using treatment codes because medical records were not available. Therefore, it was impossible to determine the exact form of psychotherapy, therapy duration, who participated in therapy sessions, and other features.

Sixth, some psychiatric medications can target multiple symptoms; however, we could not separate them exactly.

Seventh, we could not classify "other" psychiatric disorders according to their type because of the small numbers of patients diagnosed in our sample.

Lastly, this study defined patients with newly diagnosed cancer and new-onset psychiatric disorders using a set washout period. However, this relied on an assumption because records preceding 2002 do not exist in an electronic format. Therefore, potential contamination of the inclusion criteria in the study population cannot be ruled out.

Conclusion

The current study supplements the body of evidence supporting the association of psychiatric disorder onset and treatment with cancer outcomes. This study found that patients with cancer with newly diagnosed psychiatric disorders showed higher mortality rates than those without a psychiatric diagnosis, regardless of gender. Furthermore, patients with cancer with newly diagnosed psychiatric disorders showed a lower risk of mortality when they received psychiatric treatment compared with those who did not receive it. Patients with cancer are vulnerable to psychiatric disorders, which can hamper the healing process and produce negative outcomes. Psychiatric treatment can be effective in alleviating the effects of psychiatric disorders among patients with cancer. Thus, raising awareness of both the risk of psychiatric disorders among patients with cancer and the positive effects of psychiatric treatment on cancer outcomes is necessary among patients with cancer, caregivers, and oncologists. Furthermore, through a multidisciplinary approach, encouraging patients to undergo neuropsychological assessment of their mental health and receive appropriate and timely psychological treatment is important to reduce the impact of psychiatric disorders on cancer outcomes. Further studies need to be conducted using information about the exact cancer stage to better understand the relationship between psychiatric disorders and cancer mortality.

Author Contributions

Conception/design: Eun-Cheol Park
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Disclosures

The authors indicated no financial relationships.

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